Informal Online Decision Making: Current Practices and Support System Design

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ABSTRACT
Existing group decision support systems are too complex to support lightweight, informal decision making made popular by the amount of information available on the Web. From an examination of related work, an online survey and a formative study to examine how people currently use the Web for decision support, we present a set of design recommendations towards the development of an informal Web decision support tool.

Author Keywords
Group decision support systems, informal, design recommendation

ACM Classification Keywords
H5.2.User Interfaces: User-centered design.

INTRODUCTION

The Web is an unrivaled source of information. Whether we are deciding on what camera to buy, where we might go for a holiday, or what bank to use for a savings account, we increasingly turn to the Web. More specifically, while we may use the Web to gather information towards a decision, there are few mechanisms designed to support either the process of making the decision itself, or to review or share the rationale for a decision after the fact. Most research around decision support has been in the cooperative work space for formal group decision support systems (GSS), focusing on idea generation, problem formulation/solution, and decision analysis [17,2] in support of the groups identified by DeSanctis and Gallupe, "*committees, review panels, executive board meetings, task forces, and groups of managers*" [5]. Little attention has been paid to supporting smaller scale, or more informal decision-making such as between friends or colleagues, and such that can be supported by use of the Web rather than formal tools.

In order to understand what functions a tool would need to support Web-based decision making, we considered two strategies: first we looked at how work in formal GSS systems might apply to a less formal Web system; second, we carried out an online survey and a formative study to investigate how people currently use both the Web and communication tools for decision support. We present a set of design recommendations we have synthesised from these studies towards the development of an informal Web decision support tool.

RELATED WORK

Carlson presented the motivation for Decision Support Systems in terms of displaced cost (reduced costs for data gathering, computation, presentation) and added value (investigating, analysis, and comparing alternatives) [4]. Though there was work before DeSanctis and Gallupe, their seminal 1987 paper [5] can be seen as the basis for GSS research, from simple to sophisticated systems "*representing varying degrees of intervention in the decision process*", and distinctions and refinements have been made over time.

A vast corpus of decision-making studies exist: [7, 13] amongst others present summaries. Fjermestad & Hiltz [7] state that despite analysing over 200 studies there is a lack of computer supported face-to-face studies as well as relatively few asynchronous studies, and that Web-based systems need to be explored and compared. Benbunan-Fich et. al [2] are one of the few to analyse the process and content of group discussion. Their results support previous studies [15,13] documenting superior performance for asynchronous discussion, although a lower satisfaction level. Their content analysis shows the better output is due to the breadth and greater number of issues brought up in discussion. One meta-analysis, however, argues that CMC *decreases* effectiveness as well as satisfaction [1].

An architecture for decision group interaction is presented in the Co-oP system [3]. A group problem-solving process that can be abstracted to almost any GSS is identified in six steps: "*problem definition, group norm definition, prioritization of evaluation criteria, individual selection of alternatives, group selection of alternatives, consensus seeking and negotiation*". The Hermes system [11] is a recent web-based system, but focuses on supporting complex argumentative discourse between decision makers. The authors of a Web-based system for conferencing and

collaboration remark that there is a lack of methods to seek consensus and make decisions [9]. Shim et. al [17] look to the future of decision support technology, identifying the web browser, personalization, and ubiquitous computing as trends to impact DSS.

E-mail has grown to more than a communications medium, and is being used for task management, personal archiving, coordination and collaboration [18,12]. Whittaker [18] terms this as "*email overload*". Geyer [8] argues that email can be considered the most ad hoc communication system available. As a collaboration medium though, email suffers from not preserving context and structure (especially for latecomers to a conversation), and application switching (for instance, in order to attach or read related documents to a message). To bridge the gap between ad hoc and formal collaboration systems, Geyer et al. [8] introduce the notion of "object-centric collaboration", where shared artifacts are aggregated and organized into semi-structured activities, reporting that people related to the concept of "activity-centric" work.

There has been little published on more lightweight systems, but in 2000 Farnham et. al [6] compared synchronous chat with their system that allows a pre-authored structure to be applied to a discussion. They found that the script allowed groups to reach consensus, and that groups applied structure in later unstructured sessions. However, such structure must be employed judiciously as many of the negative comments focused on the time constraints placed. A highly specialized instance of online decision making can be seen in the short paper describing VERN [19], a tool to find optimal meeting times within a group. Other such lightweight tools exist, the ability in Microsoft Outlook to attach 'voting' to an e-mail, or voting and polling websites, such as Doodle and Evite.

STUDY DESIGN

Survey. In order to obtain a broad view of current practice, a Web-based survey was sent out to the authors' two affiliated groups. The brief 8 question survey asked: what types of group decisions people make, what physical location the group is in when doing so, what tools or practices people use to keep the information and if they come back to it, their experiences with such tools, and whether they ever encounter anything they would like to achieve but with existing tools cannot.

Formative study: we focused on a decision-making task in 3 different types of co-location to examine the decision-making process and highlight specific problems and differences across situations. The 3 situations were: face-to-face with 1 PC, face-to-face with multiple PCs, and asynchronously over e-mail. The groups were given a scenario of being at a conference in a location unfamiliar to them (New York City), and having to choose a restaurant for dinner with the conference chair on a given evening in a month's time. The two co-located groups were given 2 sessions of 45 minutes on consecutive days to complete the task, and the asynchronous group was given 3 days.

Though many synchronous decision-making studies have been conducted before [7], there has been a lack of computer supported face-to-face studies, and few, if any, that examine existing practice given access to the web and the users' normal working habits and applications (Notepad, email, Google Notebook, etc). 3 groups of 4 participants took part in one condition each, the participants already knew one another and were friends or colleagues. This is important since it creates less of a contrived scenario, and, combined with allowing the participants freedom to go about the task as they usually would, one from which we can gain a realistic idea of the process and problems with group decision making.

RESULTS

From related work and our results, we have defined a 3-stage cycle of online decision making (see Figure 1) which bears some similarity to information foraging theory [16]. Using this model, we can retrospectively label findings, observations and problems, and use these labels to clearly address issues in the System Design section.

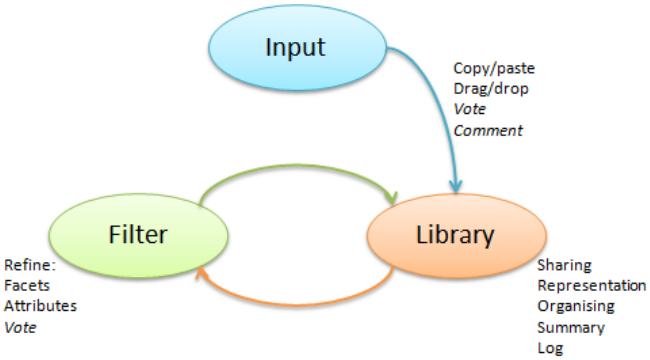

Figure 1: Cycle of online decision making. The attached labels describe findings we talk about in the Results section.

Survey results

162 responses were collected from the survey. Of the respondents, 89% were aged between 18 and 35 (overall between 17 and 65), and 78% were male. Survey participants were asked the issues or topics of decision that they made, so we could gain an idea of the variety of decisions that are considered. Responses are detailed in Figure 2. Some of these could potentially be grouped; flights, hotels may be part of holidays, but have been left as respondees entered them. This should not be seen as an exhaustive list, many responses were along the lines of "*this list would be enormous*", or "*everything, too many to list here.*" There was a difference mentioned in using the web to look up a topic, and then using instant messaging to discuss that topic, as well as just comparing different pages, and actually purchasing something.

We are also interested in the tools people currently use to conduct these online decisions, responses are detailed in Figure 3. GMail has been explicitly separated from e-mail, since people often referred to its default grouping of all e-mail messages in a thread, including those sent by you, as

helpful. 40 responses explicitly stated that they refer back to the information, to continue adding sources, to review the decision, or, "*for example, to prove who suggested which place!*" (relevant to the Log in Figure 1). An obvious distinction was made apparent in keeping browser tabs open during a quick comparison, and saving in some other format until a) the decision has been made, or b) permanently to review at a later date.

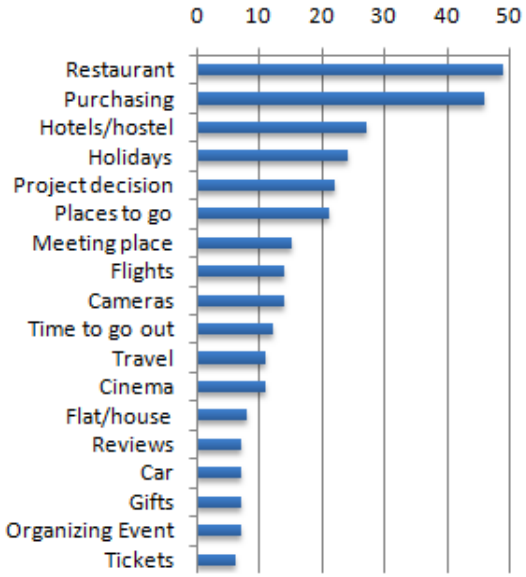

Figure 2: Decision issues and number of responses.

Many interesting comments were gained from an open ended question about experiences with current tools and what people would like to see. Some are briefly detailed here, labeled according to our model (Figure 1), and all were considered when thinking about requirements of an online decision making tool.

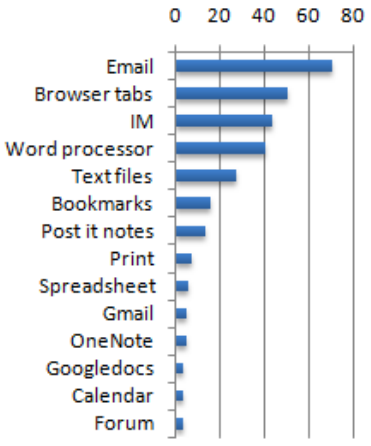

Figure 3. Tools currently used to support decision-making.

Input: Comparing information from different websites, drag/drop from a website to a library, one click add to clipboard (similar to Google Notebook). During input, sharing URLs whilst searching or seeing what was on someone else's screen was mentioned. Once the data is in the 'library', voting, annotating and commenting are also seen as important.

Library: A number of people stated it would be useful to have everyone's thoughts in one place, suggesting a *"wiki-style repository"*, or "*online blackboard*". A summary of the 'stage' the decision process was in was seen as helpful.

Filter: Seeing an overview of attributes of entities (e.g. if looking for a holiday, save the website along with price, location and dates) was mentioned, in order to filter and refine down the search, as well as extracting features from lists once created. Voting fits into this category as well as input, being used to iterate through a decision.

Study Results

Figure 4 details the different physical locations the decision making group were in. Long-term decisions could of course be made over all of these, as well as with offline interaction. These results show that while separate, asynchronous communication is the most often used, co-located decisions are still frequent, and in fact the results are remarkably balanced.

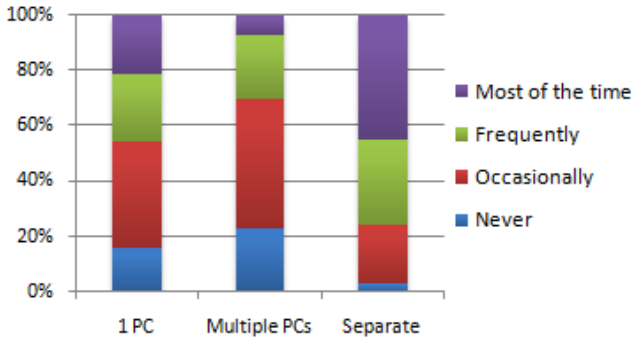

Figure 4. The frequency of different locations reported when making an online decision.

As expected from previous work [3], the overall process was similar in each group, focusing around: problem definition, individual and group selection, criteria verbalisation, and consensus finding. We highlight specific observations, problems or requests in discussion, and again group according to our model in Figure 1.

Input: Participants in the multiple PC group tried to e-mail restaurants around, after copy and pasting. In all groups, there was a tendency to search first via a map view, then by community rating site, and then to an individual restaurant site. Also in all groups participants expressed different opinions of review/rating sites, saying they trust some more than others.

Library: Interestingly, every group started by looking at a map of the location, implying integration with different representations is key. There were often "*so what are the current contenders?*" questions. Participants in the multiple PC group created a shared Google Notebook. In the 1 PC group, a text file was used with links and notes on restaurants. Participants also forgot why they liked or disliked a certain restaurant, "*we said no to this one, right?*"

Filter: In all groups facets of the data started appearing: cuisine, price, location, rating, with participants expressing preferences for each, and using these as constraints to refine their choices. The multiple PC group were frustrated there was no easy way to vote on the restaurants in Google Notebook, though liked the ability to comment.

SYSTEM DESIGN

From the survey results in Figure 3 it is apparent people use a wide variety of existing tools to make online decisions, but with many comments about improvements or suggestions, as well as observing current processes, there would be a clear value for a lightweight tool to support online decision making. We present a number of recommendations for such a tool, available through a web browser with no additional download, addressing the three areas identified in our model in Figure 1.

Input. A low barrier to entry is essential, the tool must be as natural as opening a new text document, and Google Notebooks ability to right-click 'Add to Notebook' was mentioned as desirable. A similar way to copy and 'add to tool', or even to drag and drop from a separate browser window is desirable. Searching together and sharing URLs [14] is also possible.

Library. Having a shared space for collecting and commenting on items was mentioned numerous times. Different representations of the data were seen as important, integration of a map view, for instance. To support different interactions with the system, a discussion area could be made visible, for both synchronous and asynchronous chat. Since a log of events (reasons for choosing, or discarding an option) was mentioned, tying the discussion to a specific view is feasible. A summary of recent activity and the stage in the decision process would help people remember where they were, and a 'stage' implies a process, perhaps for longer-term decisions. This process could be abstracted out into a set of definable policies (voting style, voting rounds, how to end), which would also help the problem of online groups not coming to a consensus [6].

Filter. Exposing the facets of the objects (cuisine, price, location, rating), either through entity extraction or automatically (in a similar way to Exhibit [10]), would allow users to both filter their search within objects, as well as express preferences for certain attributes. Comments could also be tied not just to an object, but to a specific facet of that object. Voting is clearly an essential feature. By logging the filter actions and the resultant voting, the system can help explain why certain decisions were made.

CONCLUSIONS

Group Decision Support Systems do not support the types of lightweight online decision-making afforded by the abundance of information on the Web. This paper contributes findings from a survey and formative studies in current practice and process in online decision making, identifying problems with existing tools, requests for new ones, and observed problems in the process. We use these to ground recommendations for features of such a tool to support these lightweight decisions. In future work we intend to implement these features, and conduct a longitudinal study to examine usage.

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